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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/622,113	Applicant(s) POHJOLA ET AL.	
	Examiner Li Liu	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *11/03/2006, Amendment*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 November 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. The certified copy of the foreign priority document has not been received.

Allowable Subject Matter

2. The indicated allowability of claims 2-7 and 9-13 are withdrawn in view of the newly discovered reference(s) to Okano et al (US 6,449,074) and Song et al (US 2004/0067059) and Kim et al (Kim et al: "A Low-Cost WDM Source with ASE Injected Fabry-Perot Semiconductor Laser", IEEE Photonics Technology Letters, Vol. 12, No. 8, August 2000, page 1067-1069). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3, 5, 6, 8, 14, and 16-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Okano et al (US 6,449,074).

1). With regard to claim 1, Okano et al disclose an optical data transmission system, the optical data transmission system comprising

a hub (Terminal Station 4 in Figure 1), a kerb location (where the Transponder 10 is located, Figure 1), a converter (Wavelength Converter 12 in Figure 1), an optical router (Optical Multiplexer 14 in Figure 11), and a plurality of optical network units (Optical Signal Sender 8 in Figure 1),

the optical network units being capable of transmitting respective data signals to the kerb location (Optical Senders 8 output original optical signals having arbitrary wavelengths to the Transponder 12, in Figure 1),

the optical router (Multiplexer 14) being capable of routing wavelength channels having predefined wavelength ranges assigned to respective optical network units for transmission to the hub (column 4, line 14-18, the optical multiplexer 14 for wavelength division multiplexing the optical signals from the wavelength converters 12 to generate WDM signal light. The WDM signal light from the optical multiplexer 14 is output to the optical fiber transmission line 6; and then the signals are transmitted to the terminal station 4), and

the converter (Wavelength Converter 12 in Figure 1) being capable of converting the data signals into the wavelength channels (column 4, line 9-13, Figure 1, wavelength converters 12 converts the optical signals having arbitrary wavelengths from the optical senders 8 into optical signals having predetermined wavelengths λ_1 to λ_n, respectively), wherein the data signals are optical signals (the data signal output from the Optical Sender is the original optical data signal, column 4 line 5-6).

2). With regard to claim 3, Okano et al disclose the data signals are used as pump signals to generate the wavelength channels (column 4, line 4-16, the original

data signals pump the converter, and the converter generate the wavelength channels having predetermined wavelengths).

3). With regard to claim 5, Okano et al disclose the wavelength channels are generated by a plurality of optically pumped sources (column 4, line 9-16, the original data signals pump the converter, and the optically pumped sources in the converter generate the wavelength channels).

4). With regard to claim 6, Okano et al disclose the optically pumped sources generate light having different wavelengths in order to define the wavelength channels having predefined distinct wavelength ranges (column 4, line 9-13, the optically pumped sources within the converters convert the optical signals having arbitrary wavelengths from the optical senders into optical signals having predetermined wavelengths λ_1 to λ_n, respectively).

5). With regard to claim 8, Okano et al disclose that the respective ones of the ONUs are sufficiently similar that they are interchangeable (column 4, line 4-6, the optical senders output optical signals having **arbitrary** wavelengths; since each optical sender can send the **arbitrary** wavelengths, it is inherent that they are sufficiently similar and interchangeable).

6). With regard to claim 14, Okano et al further disclose the optical router is a WDM (Optical Multiplexer 14 in Figure 1, column 4, line 15-17).

7). With regard to claim 16, Okano et al disclose a method of transmitting data in an optical data transmission system,

transmitting with an optical network units (Optical Senders 8 in Figure 1), respective data signal to the kerb location (where the Transponder is located, column 4, line 4-8, Optical Senders 8 output original optical signals having arbitrary wavelengths to the transponder 12, in Figure 1); and

routing wavelength channels having predefined wavelength ranges assigned to respective optical network units for transmission to a hub with an optical router (column 4, line 14-18, the optical multiplexer 14 for wavelength division multiplexing the optical signals from the wavelength converters 12 to generate WDM signal light. The WDM signal light from the optical multiplexer 14 is output to the optical fiber transmission line 6, and then transmitted to terminal Station 4, Figure 1); and,

the converter (Wavelength Converter 12 in Figure 1) converting the data signals into the wavelength channels with a converter, wherein the data signals are optical signals (column 4, line 5-6, the original optical data signals are converted into wavelength channels with predetermined wavelengths).

8). With regard to claim 17, Okano et al disclose an optical router (the Optical Multiplexer 14 in Figure 1) for an optical data transmission system (Figure 1), the optical data transmission system comprising

a hub (Terminal Station 4 in Figure 1),

a kerb location (where the Transponder 10 is located, Figure 1), and

a plurality of optical network units (Optical Signal Sender 8 in Figure 1), the optical network units being capable of transmitting respective data signals to the kerb

location (Optical Senders 8 output original optical signals having arbitrary wavelengths to the transponder 12, in Figure 1),

the optical router being capable of routing wavelength channels having predefined wavelength ranges assigned to respective optical network units for transmission to the hub (column 4, line 14-18, the optical multiplexer 14 for wavelength division multiplexing the optical signals from the wavelength converters 12 to generate WDM signal light. The WDM signal light from the optical multiplexer 14 is output to the optical fiber transmission line 6; then the signals are transmitted to the terminal station 4), and

the optical router comprising a converter to convert the data signals into the wavelength channels wherein the data signals are optical signals (column 4, line 9-13, wavelength converters 12 converts the original optical signals having arbitrary wavelengths from the optical senders 8 into optical signals having predetermined wavelengths λ_1 to λ_n, respectively).

9). With regard to claim 18, Okano et al disclose a converter (the Wavelength Converter 12 in Figure 1) for an optical data transmission system (Figure 1), the optical data transmission system comprising

a hub (Terminal Station 4 in Figure 1),

a kerb location (where the Transponder 10 is located, Figure 1),

an optical router (Multiplexer 14 in Figure 1), and

a plurality of optical network units (Optical Signal Sender 8 in Figure 1), the optical network units being capable of transmitting respective data signals to the kerb

location (Optical Senders 8 output original optical signals having arbitrary wavelengths to the transponder 12, in Figure 1),

the converter being capable of converting the data signals into wavelength channels having predefined wavelength ranges assigned to respective optical network units (column 4, line 9-13, wavelength converters 12 for wavelength converting the optical signals having arbitrary wavelengths from the optical senders 8 into optical signals having predetermined wavelengths λ_1 to λ_n, respectively), and

the optical router being capable of routing the wavelength channels for transmission to the hub wherein the data signals are optical signals (column 4, line 14-18, the optical multiplexer 14 for wavelength division multiplexing the optical signals from the wavelength converters 12 to generate WDM signal light. The WDM signal light from the optical multiplexer 14 is output to the optical fiber transmission line 6, and then transmitted to terminal Station 4, Figure 1).

10). With regard to claim 19, Okano et al disclose an optical data transmission system (Figure 1), comprising:

transmitting means (Optical Signal Sender 8 in Figure 1) for transmitting, with an optical network unit (Optical Senders 8 in Figure 1), respective optical signals to a kerb location (where the Transponder 10 is located, column 4, line 4-8, Optical Senders 8 output original optical signals having arbitrary wavelengths to the transponder 12, Figure 1);

routing means (Optical Multiplexer 14 in Figure 1) for routing wavelength channels having predefined wavelength ranges assigned to respective optical network

units for transmission to a hub with an optical router (column 4, line 14-18, the optical multiplexer 14 for wavelength division multiplexing the optical signals from the wavelength converters 12 to generate WDM signal light. The WDM signal light from the optical multiplexer 14 is output to the optical fiber transmission line 6; then the signals are transmitted to the terminal station 4); and

converting means (Wavelength Converter 12 in Figure 1) for converting the optical signals into the wavelength channels with a converter (column 4, line 9-13, wavelength converters 12 for wavelength converting the optical signals having arbitrary wavelengths from the optical senders 8 into optical signals having predetermined wavelengths λ_1 to λ_n, respectively).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 3-6, 8 and 13-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okano et al (US 6,449,074).

1). With regard to claim 1, Okano et al disclose an optical data transmission system, the optical data transmission system comprising

a hub (Terminal Station 4 in Figure 1), a kerb location (where the Transponder 10 is located, Figure 1), a converter (Wavelength Converter 12 in Figure 1), an optical

router (Optical Multiplexer 14 in Figure 11), and a plurality of optical network units (Optical Signal Sender 8 in Figure 1),

the optical network units being capable of transmitting respective data signals to the kerb location (Optical Senders 8 output original optical signals having arbitrary wavelengths to the transponder 12, in Figure 1),

the optical router (Multiplexer 14) being capable of routing wavelength channels having predefined wavelength ranges assigned to respective optical network units for transmission to the hub (column 4, line 14-18, the optical multiplexer 14 for wavelength division multiplexing the optical signals from the wavelength converters 12 to generate WDM signal light. The WDM signal light from the optical multiplexer 14 is output to the optical fiber transmission line 6; and then the signals are transmitted to the terminal station 4), and

the converter (Wavelength Converter 12 in Figure 1) being capable of converting the data signals into the wavelength channels (column 4, line 9-13, Figure 1, wavelength converters 12 converts the optical signals having arbitrary wavelengths from the optical senders 8 into optical signals having predetermined wavelengths λ_1 to λ_n, respectively), wherein the data signals are optical signals (the data signal output from the Optical Sender is the original optical data signal, column 4 line 5-6).

But, Okano et al does not expressly state that the Terminal Station is the hub and the Transponder is located at the kerb.

However, a hub is just a common connection point for devices in a network, and it enables signals to go from one device (or segment) to another, or forwards the packet

to the correct port. The Terminal Station (4 in Figure 1) does receive the optical signals and forwards the signals to the correct port (OR 20 in Figure 1), therefore, it is viewed that the Terminal Station is a hub according to the general definition of the hub.

Also, the system of Okano et al relates "generally to wavelength division multiplexing (WDM) using a plurality of optical signals having different wavelengths, and more particularly to an optical transmission device and an optical communication system applied to WDM". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Okano's system in the passive optical network and put the transponder at the kerb so that the data management and signal routing can be made easier.

2). With regard to claim 3, Okano et al discloses all of the subject matter as applied to claim 1 above. And Okano et al further disclose the data signals are used as pump signals to generate the wavelength channels (column 4, line 4-16, the original data signals pump the converter, and the converter generate the wavelength channels having predetermined wavelengths).

3). With regard to claim 4, Okano et al discloses all of the subject matter as applied to claim 1 above. And Okano et al further disclose the original data signals have arbitrary wavelengths. But Okano et al does not expressly state that the data signals are within a wavelength range which does not include the wavelength or wavelengths of the wavelength channels.

However, since Okano et al disclose that the original data signals have **arbitrary** wavelengths (column 4, line 4-16), and the converter converts **arbitrary** wavelengths

into the wavelength channels having **predetermined** wavelengths, it is obvious that the **arbitrary** wavelengths can be different from the wavelengths of the wavelength channels (predetermined wavelengths).

4). With regard to claim 5, Okano et al discloses all of the subject matter as applied to claim 1 above. And Okano et al further disclose the wavelength channels are generated by a plurality of optically pumped sources (column 4, line 9-16, the original data signals pump the converter, and the optically pumped sources in the converter generate the wavelength channels).

5). With regard to claim 6, Okano et al discloses all of the subject matter as applied to claims 1 and 5 above. And Okano et al further disclose the optically pumped sources generate light having different wavelengths in order to define the wavelength channels having predefined distinct wavelength ranges (column 4, line 9-13, the optically pumped sources within the wavelength converters convert the optical signals having arbitrary wavelengths from the optical senders into optical signals having predetermined wavelengths λ_1 to λ_n, respectively).

6). With regard to claim 8, Okano et al discloses all of the subject matter as applied to claim 1 above. And Okano et al further disclose the optical network units (Optical Senders 8 in Figure 1) output the original data signals have **arbitrary wavelengths**. But Okano et al does not expressly state that the respective ones of the ONUs (optical senders) are sufficiently similar that they are interchangeable.

However, since optical senders output the original data signals have arbitrary wavelengths, it is obvious that they can be made sufficiently similar and interchangeable (the "sufficiently similar" is the subset of the "arbitrary").

7). With regard to claim 13, Okano et al discloses all of the subject matter as applied to claim 1 above. But Okano et al does not expressly states that the pumping light is at a wavelength different to the wavelength of light which is used to carry data traffic in upstream and downstream directions.

However, since Okano et al disclose that the original data signals have **arbitrary** wavelengths (column 4, line 4-16), and the converter converts **arbitrary** wavelengths into the wavelength channels having **predetermined** wavelengths, it is obvious that the **arbitrary** wavelengths can be different from the wavelengths of the wavelength channels (predetermined wavelengths). In Figure 1 of Okano et al, a downstream signal transmission is shown. However, the bi-directional WDM system has been widely used in the passive optical network. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the bi-directional data transmission as widely used in the art to Okano's system and make the wavelength of the original optical signal different from the wavelengths of both upstream and downstream directions, so that the system cost can be reduced by the bi-directional transmission, and system management can be made easy by using different wavelengths for the original data signal and the upstream and downstream signals.

8). With regard to claim 14, Okano et al discloses all of the subject matter as applied to claim 1 above. And Okano et al further disclose the optical router is a WDM (Optical Multiplexer 14 in Figure 1, column 4, line 15-17).

9). With regard to claim 15, Okano et al discloses all of the subject matter as applied to claim 1 above. But Okano et al does not expressly discloses that the optical router is an arrayed waveguide grating (AWG).

However, the AWG has been widely used in the art because of its lower loss, flatter passband, and easier to realize on an integrated-optic substrate. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the AWG taught as widely used in the art to the system of Okano et al so that a lower loss, flatter passband optical router can be obtained.

10). With regard to claim 16, Okano et al disclose a method of transmitting data in an optical data transmission system,

transmitting with an optical network units (Optical Senders 8 in Figure 1), respective data signal to the kerb location (where the Transponder is located, column 4, line 4-8, Optical Senders 8 output original optical signals having arbitrary wavelengths to the transponder 12, in Figure 1); and

routing wavelength channels having predefined wavelength ranges assigned to respective optical network units for transmission to a hub with an optical router (column 4, line 14-18, the optical multiplexer 14 for wavelength division multiplexing the optical signals from the wavelength converters 12 to generate WDM signal light. The WDM

signal light from the optical multiplexer 14 is output to the optical fiber transmission line 6, and then transmitted to terminal Station 4, Figure 1); and,

the converter (Wavelength Converter 12 in Figure 1) converting the data signals into the wavelength channels with a converter, wherein the data signals are optical signals (column 4, line 5-6, the original optical data signals are converted into wavelength channels with predetermined wavelengths).

But, Okano et al does not expressly state that the Terminal Station is the hub and the Transponder is located at the kerb.

However, a hub is just a common connection point for devices in a network, and it enables signals to go from one device (or segment) to another, or forwards the packet to the correct port. The Terminal Station (4 in Figure 1) does receive the optical signals and forwards the signals to the correct port (OR 20 in Figure 1), therefore, it is viewed that the Terminal Station is a hub according to the general definition of the hub.

Also, the system of Okano et al relates "generally to wavelength division multiplexing (WDM) using a plurality of optical signals having different wavelengths, and more particularly to an optical transmission device and an optical communication system applied to WDM". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Okano's system in the passive optical network and put the transponder at the kerb so that the data management and signal routing can be made easier.

11). With regard to claim 17, Okano et al disclose an optical router (the Optical Multiplexer 14 in Figure 1) for an optical data transmission system (Figure 1), the optical data transmission system comprising

a hub (Terminal Station 4 in Figure 1),

a kerb location (where the Transponder 10 is located, Figure 1), and

a plurality of optical network units (Optical Signal Sender 8 in Figure 1), the optical network units being capable of transmitting respective data signals to the kerb location (Optical Senders 8 outputs original optical signals having arbitrary wavelengths to the transponder 12, in Figure 1),

the optical router being capable of routing wavelength channels having predefined wavelength ranges assigned to respective optical network units for transmission to the hub (column 4, line 14-18, the optical multiplexer 14 for wavelength division multiplexing the optical signals from the wavelength converters 12 to generate WDM signal light. The WDM signal light from the optical multiplexer 14 is output to the optical fiber transmission line 6; then the signals are transmitted to the terminal station 4), and

the optical router comprising a converter to convert the data signals into the wavelength channels wherein the data signals are optical signals (column 4, line 9-13, wavelength converters 12 converts the original optical signals having arbitrary wavelengths from the optical senders 8 into optical signals having predetermined wavelengths λ_1 to λ_n, respectively).

But, Okano et al does not expressly state that the Terminal Station is the hub and the Transponder is located at the kerb.

However, a hub is just a common connection point for devices in a network, and it enables signals to go from one device (or segment) to another, or forwards the packet to the correct port. The Terminal Station (4 in Figure 1) does receive the optical signals and forwards the signals to the correct port (OR 20 in Figure 1), therefore, it is viewed that the Terminal Station is a hub according to the general definition of the hub.

Also, the system of Okano et al relates "generally to wavelength division multiplexing (WDM) using a plurality of optical signals having different wavelengths, and more particularly to an optical transmission device and an optical communication system applied to WDM". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Okano's system in the passive optical network and put the transponder at the kerb so that the data management and signal routing can be made easier.

12). With regard to claim 18, Okano et al disclose a converter (the Wavelength Converter 12 in Figure 1) for an optical data transmission system (Figure 1), the optical data transmission system comprising

a hub (Terminal Station 4 in Figure 1),

a kerb location (where the Transponder 10 is located, Figure 1),

an optical router (Multiplexer 14 in Figure 1), and

a plurality of optical network units (Optical Signal Sender 8 in Figure 1), the optical network units being capable of transmitting respective data signals to the kerb

location (Optical Senders 8 outputs original optical signals having arbitrary wavelengths to the transponder 12, in Figure 1),

the converter being capable of converting the data signals into wavelength channels having predefined wavelength ranges assigned to respective optical network units (column 4, line 9-13, wavelength converters 12 for wavelength converting the optical signals having arbitrary wavelengths from the optical senders 8 into optical signals having predetermined wavelengths λ_1 to λ_n, respectively), and

the optical router being capable of routing the wavelength channels for transmission to the hub wherein the data signals are optical signals (column 4, line 14-18, the optical multiplexer 14 for wavelength division multiplexing the optical signals from the wavelength converters 12 to generate WDM signal light. The WDM signal light from the optical multiplexer 14 is output to the optical fiber transmission line 6, and then transmitted to terminal Station 4, Figure 1).

But, Okano et al does not expressly state that the Terminal Station is the hub and the Transponder is located at the kerb.

However, a hub is just a common connection point for devices in a network, and it enables signals to go from one device (or segment) to another, or forwards the packet to the correct port. The Terminal Station (4 in Figure 1) does receive the optical signals and forwards the signals to the correct port (OR 20 in Figure 1), therefore, it is viewed that the Terminal Station is a hub according to the general definition of the hub.

Also, the system of Okano et al relates "generally to wavelength division multiplexing (WDM) using a plurality of optical signals having different wavelengths, and

more particularly to an optical transmission device and an optical communication system applied to WDM". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Okano's system in the passive optical network and put the transponder at the kerb so that the data management and signal routing can be made easier.

13). With regard to claim 19, Okano et al disclose an optical data transmission system (Figure 1), comprising:

transmitting means (Optical Signal Sender 8 in Figure 1) for transmitting, with an optical network unit, respective optical signals to a kerb location (column 4, line 4-8, Optical Senders 8 output optical signals (original optical signals) having arbitrary wavelengths to the transponder 12, in Figure 1; it is obvious that the Transponder can be located at the kerb location);

routing means (Optical Multiplexer 14 in Figure 1) for routing wavelength channels having predefined wavelength ranges assigned to respective optical network units for transmission to a hub with an optical router (column 4, line 14-18, the optical multiplexer 14 for wavelength division multiplexing the optical signals from the wavelength converters 12 to generate WDM signal light. The WDM signal light from the optical multiplexer 14 is output to the optical fiber transmission line 6; then the signals are transmitted to the terminal station 4); and

converting means (Wavelength Converter 12 in Figure 1) for converting the optical signals into the wavelength channels with a converter (column 4, line 9-13, wavelength converters 12 (#1 to #n) for wavelength converting the optical signals

having arbitrary wavelengths from the optical senders 8 (#1 to #n) into optical signals having predetermined wavelengths λ_1 to λ_n, respectively).

But, Okano et al does not expressly state that the Terminal Station is the hub and the Transponder is located at the kerb.

However, a hub is just a common connection point for devices in a network, and it enables signals to go from one device (or segment) to another, or forwards the packet to the correct port. The Terminal Station (4 in Figure 1) does receive the optical signals and forwards the signals to the correct port (OR 20 in Figure 1), therefore, it is viewed that the Terminal Station is a hub according to the general definition of the hub.

Also, the system of Okano et al relates "generally to wavelength division multiplexing (WDM) using a plurality of optical signals having different wavelengths, and more particularly to an optical transmission device and an optical communication system applied to WDM". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Okano's system in the passive optical network and put the transponder at the kerb so that the data management and signal routing can be made easier.

7. Claims 7 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okano et al (US 6,449,074) as applied to claim 1 and 5 above, and in view of Kim et al (Kim et al: "A Low-Cost WDM Source with ASE Injected Fabry-Perot Semiconductor Laser", IEEE Photonics Technology Letters, Vol. 12, No. 8, August 2000, page 1067-1069) and Song et al (US 2004/0067059).

1). With regard to claim 7, Okano et al discloses all of the subject matter as applied to claims 1 and 5 above. But Okano et al does not disclose that the optically pumped sources each comprise a laser cavity, mirrors defining the cavity, and wavelength selective elements inside the cavity. In the converter of Okano, the O/E, E/O elements are used to convert the wavelengths.

However, Kim et al, in the same field of endeavor, discloses a laser cavity: a wavelength locked Fabry-Perot laser as a low cost WDM source for wavelength independent operation of the optical network units (Figure 1 and Figure 5). And, another prior art, Song et al, teaches a partial mirror (220 in Figure 2) placed in the remote node (or kerb side), and the partial mirror (220 in Figures 2 and 4) is adapted to partially feed back the multiplexed signal of the second optical signals transmitted to the central office, thereby self-injection locking a plurality of second transmitters included in respective optical network units (Figure 2 and Figure 4). Since a Fabry-Perot laser is used, another reflective mirror must be present at the other end of the F-P laser 310. Song et al also discloses that a filter element (the WDM unit 210 in Figures 2 and 4) inside the cavity (that is between the partial mirror 220 and the end surface of the F-P laser 310).

Since the F-P laser cavity is a cost-effective component, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the laser cavity as taught by Kim et al and Song et al to the system of Okano et et al so that a low cost WDM source for wavelength independent operation of the optical network units can be obtained.

2). With regard to claim 9, Okano et al discloses all of the subject matter as applied to claims 1 and 5 above. And Okano in view of Kim et al and Song et al further discloses that the optically pumped sources are injection locked lasers (Figures 1 and 5 of Kim et al, the F-P lasers are injection locked lasers).

3). With regard to claim 10, Okano et al discloses all of the subject matter as applied to claims 1, 5 and 9 above. And Okano in view of Kim et al and Song et al further discloses the injection wavelength is selected by a WDM and/or a AWG (Figures 1 and 5 of Kim et al, the AWG is used to select the injection wavelength).

4). With regard to claim 11, Okano et al discloses all of the subject matter as applied to claims 1 and 5 above. And Okano in view of Kim et al and Song et al further discloses the optically pumped sources are external cavity lasers (Figures 2 and 4 of Song et al: the partial mirror 220 and the end surface of the F-P laser consist of the external cavity of the laser).

5). With regard to claim 12, Okano et al discloses all of the subject matter as applied to claims 1, 5, 9 and 10 above. And Okano in view of Kim et al and Song et al further discloses that the optical router is within the laser cavity of at least one optically pumped source (Figures 2 and 4 of Song et al: the WDM 200 is within the laser cavity).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lee et al (2001/0004290, US 2003/0142978; US 2005/0163503) discloses a Methods and apparatuses to provide a wavelength division-multiplexing passive optical network based on wavelength-locked wavelength-division-multiplexed light sources.

Shin et al (US 2004/0234265) discloses a wavelength division multiplexing optical transmitter using Fabry-Perot laser.

Deng et al (US 2002/0196491) disclose a passive optical network in which a plurality of wavelength division multiplexed optical signals are exchanged between terminals.

Dyke et al (US 6,870,836) disclose a system to enable the transfer of IP format data over a point-to-multipoint PON.

Darcie et al (US 5,694,234) disclose a PON that spectrally slices optical signals transmitted in both upstream and downstream directions utilizing WDM routing.

Chan et al (Chan et al: "Upstream traffic transmitter using injection-locked Fabry-Perot laser diode as modulator for WDM access networks", ELECTRONICS LETTERS, January 3, 2002, Vol. 38, No. 1, page 43-45).

Park et al (Park et al: "DWDM-Based FTTC access network", Journal of Lightwave Technology, Vol. 19, No. 12, December 2001, page 1851-1855) disclose a DWDM-Based FTTC access network).

Lee (Lee: "Passive Optical Networks for FTTx Applications", OFC 2005, March 2005, OWP3).

Morales et al (US 5,706,111) disclose an optical communication network in which a converter is used to convert the fixed wavelength from subscriber into another wavelength to be transmitted to CO.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu
January 8, 2007

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